



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Secretary

EDWARD P. KUNCE
Acting Commissioner

RENEWAL OF PILOTING APPROVAL

Pursuant to Title 5, 310 CMR 15.000

Name and Address of Applicant:

F.R. Mahony & Associates
273 Weymouth Street
Rockland, MA 02370

Trade name of technology and model numbers: Amphidrome Process (hereinafter the "System").

Date of Application: November 17, 2000
Transmittal Number: W016262
Date of Issuance: 5/30/01
Date of Expiration: 5/30/06

Authority for Issuance

Pursuant to Title 5 of the State Environmental Code, 310 CMR 15.000, the Department of Environmental Protection hereby issues this Approval to: F.R. Mahony & Associates, 273 Weymouth Street, Rockland, MA 02370 (hereinafter "the Company"), to Pilot in the Commonwealth of Massachusetts the System described herein. Sale and use of the System are conditioned on and subject to compliance by the Company and the System owner with the terms and conditions set forth below. Any noncompliance with the terms or conditions of this Approval constitutes a violation of 310 CMR 15.000.

Glenn Haas, Acting Assistant Commissioner
Bureau of Resource Protection
Department of Environmental Protection

Date

I. Purpose

1. The purpose of this Approval is to provide field testing and technical demonstration of the System in Massachusetts, on a Piloting Approval basis, so as to evaluate whether the System can function effectively.
2. With the necessary permits and approvals required by 310 CMR 15.000, this Pilot Approval authorizes the use and installation of the System in Massachusetts, and requires testing so that the Department can determine whether the System consistently can or cannot function to reduce total nitrogen ($TN = TKN + NO_3 + NO_2$) to less than 10 mg/L.
3. The System may only be installed on facilities that meet the criteria of 310 CMR 15.285(2).

II. Design Standards

1. The Amphidrome Process is a biological wastewater treatment system that utilizes a Submerged Attached-Growth Sequencing Bioreactor (SAGSB). The System consists of an anoxic/equalization tank, which must comply with the design criteria set forth below, a single reactor which alternates between aerobic and anaerobic conditions, and a clear well. Wastewater passes from the anoxic/equalization tank, through a granular biological filter and into the clear well. A pump is then used to reverse the flow back to the anoxic/equalization tank. This cycle is repeated multiple times and the effluent is discharged to the soil absorption system. A schematic of the System is attached to this Approval.
 - i. The anoxic/equalization tank shall be designed to have a total working volume equal to one day's design flow plus the volume of one backwash.
 - ii. The residual volume (i.e. volume below the effluent invert) shall equal one day's design flow.
 - iii. The height of the effluent pipe from the bottom of tank shall be at least 4 ft.
 - iv. The effluent tee shall not be more than 1 ft. below the effluent invert.
 - v. The volume between the influent invert and the effluent invert (i.e. fluctuating volume) must be equal to the volume required for one backwash.
 - vi. The influent invert shall be placed as close to the top of the tank as possible.
 - vii. The influent and effluent tees shall be located under the access lids or manholes, and positioned at opposite ends of the tank.
 - viii. The riser of the tee shall come up into the riser of the tank to ensure that it is above the high water level.
 - ix. A minimum of a 1500 gallon anoxic/equalization tank is required.

The requirements in 310 CMR 15.223(1) and 310 CMR 15.224 do not apply to the System.

2. The System shall be installed in series between the building sewer and the soil absorption system of a standard Title 5 system constructed in accordance with 310 CMR 15.100 – 15.279, subject to the provisions of this Approval.
3. In accordance with 310 CMR 15.217(2), an increase in calculated allowable nitrogen loading per acre is allowed for facilities with the use of the System in areas subject to nitrogen loading limitations under 310 CMR 15.214. When used in such areas:
 - i. for residential facilities with a design flow less than 2,000 gallons per day (gpd), the design flow shall not exceed **660** gallons per day per acre (gpda),
 - ii. for non-residential facilities with a design flow less than 2,000 gpd, the design flow shall not exceed **550** gpda,
 - iii. for residential facilities and non-residential facilities with design flows 2,000 gpd or greater, the design flow shall not exceed **440** gpda.
4. For a System proposed to meet an effluent limitation of 10 mg/L for TN, the soil absorption system may be designed in accordance with the following table. As part of an individual application to install and use the System for a system upgrade/remedial use, the applicant of the System shall demonstrate that a soil absorption system (SAS) at least 50% of the size of an SAS designed in accordance with 310 CMR 15.000 can be installed on the facility.

Effluent loading rates gpd/sq. ft. for a System proposed to meet TN of 10 mg/L

Perc. Rate (MPI)	Pits or Chambers	Trenches
≤5	3.0	2.5
5-10	2.5	1.5
10-20	1.5	1.0

III. General Conditions

1. No more than 15 Systems may be installed under this Approval. A representative of the Company shall be onsite to oversee each System installation.
2. All provisions of 310 CMR 15.000 are applicable to the use of this System, the System owner and the Company, except those that specifically have been varied by the terms of this Approval.
3. Any required operation and maintenance shall be performed in accordance with a

Department approved plan. Any required sample analysis shall be conducted by a DEP approved laboratory approved for wastewater analysis for the parameters to be analyzed. It is a violation of this Approval to falsify any data collected pursuant to an approved testing plan, to omit any required data or to fail to submit any report required by such plan.

4. The System table below contains monitoring requirements for Systems installed under this Approval. Sampling and analyses shall be conducted for biochemical oxygen demand (BOD₅), total suspended solids (TSS), TN and pH.

Facility Type	Stream	Frequency	Sample Type
Residential	Effluent	Every other month for the first 18 months, quarterly thereafter	Grab
Non-residential	Influent* & Effluent	Monthly for the first twelve months, quarterly thereafter	Composite*

* Unless the Department determines otherwise.

5. The facility served by the System and the System itself shall be open to inspection and sampling by the Department and the local approving authority at all reasonable times.
6. In accordance with applicable law, the Department and/or the Board of Health may require the owner of the System to cease operation of the system and/or to take any other action as it deems necessary to protect public health, safety, welfare and the environment.
7. The Department has not determined that the performance of the System will provide a level of protection to public health and safety and the environment that is at least equivalent to that of a sewer system. Accordingly, no System shall be installed, if it is feasible to connect the facility to a sanitary sewer, unless as allowed pursuant to 310 CMR 15.004.

IV. Conditions Applicable to the System Owner

1. The System is approved in connection with the discharge of sanitary wastewater only. Any non-sanitary wastewater generated or used at the facility served by the System shall not be introduced into the System and shall be lawfully disposed of.
2. Prior to installation of the System, the proposed owner shall submit to the Department the written approval of the local approving authority, together with a copy of the complete application submitted to the local approving authority and a complete DEP application and obtain DEP written approval.
3. Throughout its life, the System shall be under an operation and maintenance (O & M) and sampling agreement. No System shall be used until an O&M plan is

submitted to the Department and the Board of Health which:

- a. provides for the contracting of a person or firm competent in providing services consistent with the System's specifications and the operation and maintenance requirements specified by the designer and those specified by the Department;
 - b. contains routine O&M activities specified by the Company necessary for the proper operation and maintenance of the System;
 - c. contains procedures for written notification to the Department and the Board of Health within five days of a System failure or alarm event and for corrective measures to be taken immediately;
 - d. provides the name of an operator, which must be a Massachusetts certified operator as required by 257 CMR 2.00, of the appropriate grade, that will operate, maintain and sample the System:
 - for a System serving a facility with a design flow less than 2,000 gpd, the operator must operate and maintain the System at least every three months and anytime there is an alarm event;
 - for a System serving facility with a design flow of 2,000 gpd or greater, the operator must operate and maintain the System at least monthly and anytime there is an alarm event; and
 - e. contains a copy of the O & M and sampling agreement, which reflects the requirements of this Approval.
4. For the first 18 months of System operation, the O & M and sampling agreement shall be with the Company or its qualified subcontractor. Subsequent agreements shall be for at least one year with a Massachusetts certified operator of the appropriate grade. After 18 months of monitoring and at the written request of the owner, the Department may reduce the monitoring requirements.
5. Effluent discharge concentrations from the System shall meet or exceed secondary treatment standards of 30 mg/L biochemical oxygen demand (BOD₅) and 30 mg/L total suspended solids (TSS). The effluent pH shall not vary more than 0.5 standard units from the influent water supply. The TN concentration in the effluent discharged from the System : i) shall not exceed 10 mg/L for a System designed in accordance with the effluent loading rate table on page 3, paragraph 4 of this Approval; and ii) for a System with an SAS designed in accordance with the applicable effluent loading rate in Title 5, shall not exceed 19 mg/L for residential facilities and 25 mg/L for nonresidential facilities.
6. After the first 18 months of System operation, if on two consecutive sampling events, the effluent exceeds the applicable TN concentration, or the BOD or the TSS limitation, then the owner shall have the person or firm contracted to operate and maintain the System submit a report to the Department, within 60 days of the second exceedance, on the reasons for the exceedances and containing

recommendations to be followed to prevent further violations.

7. After the first 18 months of System operation, the owner shall submit monitoring data and O & M inspection results to the Department and the Board of Health within 30 days of each sampling date and each inspection date. The inspection results must be recorded on a DEP approved inspection form and a technology checklist, copies of which are attached to this Approval. The forms must be completed by the System operator.
8. The owner shall at all times have the System properly operated and maintained in accordance with the Company's and the designer's operation and maintenance requirements and this Approval.
9. Anytime the operator is changed, within seven days of such change, the owner shall both notify the Department and the Board of Health in writing and submit a copy of the new O & M and sampling agreement to the Department and the Board of Health.
10. The owner shall furnish the Department any information, which the Department may request regarding the System or the facility served by the System within 21 days of the date of receipt of that request
11. The owner shall provide a copy of this Approval, prior to the signing of a purchase and sale agreement for the facility served by the System or any portion thereof, to the proposed new owner.
12. The owner shall record in the appropriate registry of deeds a notice that discloses the existence of this Pilot Use approved alternative system and the involvement of the Department in the approval of the system. Prior to the issuance of a Certificate of Compliance for the system, the owner shall both record the notice in the registry and submit to the Department and the Board of Health the book and page number of the recording.
13. Within fourteen days of the Board of Health's issuance of the Certificate of Compliance for the System, the owner shall submit a copy of the Certificate of Compliance to the Department.

V. Conditions Applicable to the Company

1. By January 31 of each year, the Company shall submit to the Department a report, signed by a corporate officer, general partner or Company owner, that contains information on the System. The report shall state: a) for the previous calendar year, the number of Systems sold for use in Massachusetts, the address of each installed System, the System owner's name and address, the type of use (e.g. residential, commercial, school, institutional), the application rate and the design flow; and b) for all Systems installed since the date of issuance of the first Piloting Approval for the System (June 29, 1995), all known failures, malfunctions and corrective actions taken and the date and address of each such event.
2. The Company shall notify the Director of the Watershed Permitting Program at least 30 days in advance of the proposed transfer of ownership of the technology

for which this Approval is issued. Said notification shall include the name and address of the proposed new owner and a written agreement between the existing and proposed new owner containing a specific date for transfer of ownership, responsibility, coverage and liability between them. All provisions of this Approval applicable to the Company shall be applicable to successors and assigns of the Company, unless the Department determines otherwise.

3. The Company shall furnish the Department any information that the Department requests regarding the System within 21 days of the date of receipt of that request.
4. Prior to its sale of the System, the Company shall provide the purchaser with a copy of this Approval. In any contract for distribution or sale of the System, the Company shall require the distributor or seller to provide the purchaser of the System, prior to any sale of the System, with a copy of this Approval.
5. For the first 18 months of operation of each System, the Company shall perform the O & M and sampling requirements for the System in accordance with the O & M and sampling requirements of this Approval.
6. Effluent discharge concentrations from the System shall meet or exceed secondary treatment standards of 30 mg/L biochemical oxygen demand (BOD₅) and 30 mg/L total suspended solids (TSS). The effluent pH shall not vary more than 0.5 standard units from the influent water supply. The TN concentration in the effluent discharged from the System : i) shall not exceed 10 mg/L for a System designed in accordance with the effluent loading rate table and conditions on page 3, paragraph 4 of this Approval; and ii) for a System with an SAS designed in accordance with the applicable effluent loading rate in Title 5, shall not exceed 19 mg/L for residential facilities and 25 mg/L for nonresidential facilities.
7. After the first six months of operation of any System and within its first 18 months of operation, if on two consecutive sampling events, the effluent from any System exceeds the applicable TN concentration, or the BOD or the TSS limitation, then the Company shall submit a report to the Department, within 60 days of the second exceedance, on the reasons for the exceedances and containing recommendations to be followed to prevent future violations.
8. For the first 18 months of operation of each System, the Company shall submit monitoring data and O & M inspection results to the Department and the Board of Health within 30 days of each sampling date and each inspection date. The inspection results must be recorded on a DEP approved inspection form and a technology checklist, copies of which are attached to this Approval. The forms must be completed by the Company or its qualified subcontractor.
9. If the Company wishes to continue this Piloting Approval after its expiration date, the Company shall apply for and obtain a renewal of this Approval. The Company shall submit a renewal application at least 180 days before the expiration date of this Approval, unless permission for a later date has been granted in writing by the Department.

VI. Reporting

1. All notices and other documents required to be submitted to the Department by this Approval shall be submitted to:
Director
Watershed Permitting Program
Department of Environmental Protection
One Winter Street - 6th floor
Boston, Massachusetts 02108

VII. Rights of the Department

1. The Department may suspend, modify or revoke this Approval for cause, including, but not limited to, noncompliance with the terms of this Approval, the System's failure to meet applicable limitations, non-payment of the annual compliance assurance fee, for obtaining the Approval by misrepresentation or failure to disclose fully all relevant facts or any change in or discovery of conditions that would constitute grounds for discontinuance of the Approval, or as necessary for the protection of public health, safety, welfare or the environment, and as authorized by applicable law. The Department reserves its rights to take any enforcement action authorized by law with respect to this Approval and/or the System against the owner, or operator of the System and/or the Company.

VIII. Expiration date

1. Notwithstanding the expiration date of this Approval, any System sold and installed prior to the expiration date of this Approval, and approved, installed and maintained in compliance with this Approval (as it may be modified) and 310 CMR 15.000, may remain in use unless the Department, the local approving authority, or a court requires the System to be modified or removed, or requires discharges to the System to cease.